Chapter 5

Blind Source Separation: Models, Concepts, Algorithms and Performance

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Abstract

Blind source separation has recently raised an increasing interest. For instance, it is now often considered as a means to exploit the spatial diversity in antenna array processing when source signals and array response are unknown, yielding more powerful processing schemes in digital communications, radar, and sonar.

Another instance is the so-called Independent Component Analysis (ICA), which can be viewed a a general-purpose tool taking the place of the Principal Component Analysis (PCA), thus being applicable in a wide range of problems, including data analysis. Instances of this versatile framework are subsequently pointed out.

This chapter is a survey of the problem, encompassing algebraic and statistical tools as well as concrete numerical algorithms, and performance analysis. It includes a thorough bibliographical state of the art. The authors think that the blind source separation algorithms may be implemented in the near future in operational systems on a much larger scale. Improvements to be carefully studied include, in particular, the ability to detect and extract more sources than sensors.

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